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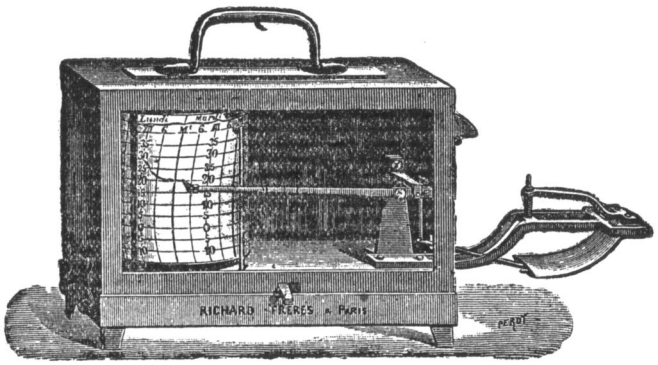
The foregoing summary shows that the excellent atmosphere at Mt. Hamilton has made it possible for the Lick Observatory to render material services to cometary astronomy by following faint comets as long as they are visible at all, thus making greater arcs available in the calculation of their definitive orbits. E. S. H.

NEW INSTRUMENTS FOR THE LICK OBSERVATORY.

The Board of Directors of the BACHE Fund of the National Academy of Sciences has loaned to the Lick Observatory a spectroscope specially designed for the observation of faint objects, as the Aurora and the Zodiacal Light. It will be used here to examine the spectrum of the latter object.——The Trustees of the THOMPSON Fund of the American Association for the Advancement of Science have made a grant of money for the construction of a small spectroscope to be used in connection with the great telescope in the observation of variable stars. The thanks of the Observatory are returned for these material additions to our spectroscopic equipment.——Hon. C. F. CROCKER has authorized the construction of an equatorial stand to take the WILLARD photographic telescope bought by him for the observation of the eclipse of December, 1889. The mounting will be made by Mr. BRASHEAR, and will be provided with a driving-clock, controlled in the manner invented by Mr. KEELER. The WILLARD lens, together with a 5½-inch DALLMEYER camera (lent to us by Mr. PIERSON), will be mounted side by side, for the present, and will be employed by Mr. BARNARD in making photographs of the Milky Way.——The large periscopic eye-piece made by the GUNDLACH Optical Company has been received. Its glasses are made from the new Jena material. The field-lens is of crown, and is six inches in diameter. The rays from this pass through a triple eye-lens, three inches in aperture. The whole length of the eye-piece is ten inches, and it weighs about thirteen pounds. The field of view is over thirty minutes. The equivalent focal distance is five inches, and, therefore, its magnifying power on the great telescope (focus 694.4 inches) is about 140 diameters. It will not utilize the whole area of the objective, consequently. It gives admirable views of the larger nebulæ, the moon, etc., as the field is flat and the color-correction is excellent.——A self-registering thermometer, made by RICHARD Frères of Paris, has been purchased for trial. The instrument runs a week at one winding, and appears to be very satisfactory. Its cost is but 135 francs in Paris. ——An improvement to an old instrument is often more import-

ant than the addition of a totally new one. Through the kindness of Professor T. C. MENDENHALL, Chief of the United States Coast and Geodetic Survey, a very important addition has been made to the measuring engine of the Lick Observatory by the determination of the errors of its glass scale A. This scale has 300 divisions, about 0.02 inches apart. Mr. O. H. TITTMAN, together with Messrs. PARSONS and FISCHER of the Survey, have investigated this scale,



SELF-REGISTERING THERMOMETER.

and have determined the errors of each one of the 300 divisions to the nearest 0.00001 inch. The scale thus becomes available for the examination of micrometer screws, etc., and particularly for the measures of stellar photographs taken with the large telescope where $1' = 0.1658$ inches, $1'' = 0.00276$ inches, etc. In order that the benefit of this work of the Coast Survey shall be as widely spread as possible, the Lick Observatory offers to determine the errors of scales not longer than four or five inches belonging to institutions in California, provided such scales are to be used for strictly scientific purposes. E. S. H.

A recent addition to the original spectroscopic apparatus of the Lick Observatory is a short-focus observing telescope for the large star spectroscope by Mr. BRASHEAR. It is used with the same micrometer and other accessories that serve for the larger telescope, and is more convenient for ordinary work. The objective and a new collimator-objective of 1½ inches aperture and 20 inches focus, are made of Jena glass, cemented with Canada balsam to diminish loss of light by reflection. As small lenses made of Jena glass can now be readily obtained, it seems worth while to point out the great advantages they possess over ordinary objectives for spectroscopic work. With

ordinary objectives, if it is desired to measure the angular distance between two lines in parts of the spectrum which differ greatly in color, the focus must be adjusted for each line, otherwise the observation will be affected by error of parallax; but the adjustment of focus introduces another source of error in the irregularities of the eye-piece slide, and moreover, if the light is to pass through the prism in parallel rays, the change of focus must be divided between the observing telescope and the collimator. (In certain special forms of apparatus this is effected automatically.) With objectives properly made of Jena glass, however, the chromatic aberration is so small that all except the extreme parts of the spectrum have practically the same focus, and no adjustment is required, an advantage which adds greatly to the convenience as well as to the accuracy of the observations. The superiority of Jena glass objectives for usual telescopic work has been pointed out by Dr. Hastings, and for spectroscopic work the advantages are even more manifest. The images of bright objects with such a telescope are nearly free from false color, resembling the images formed by a reflector, and have almost an abnormal appearance to an eye accustomed to the ordinary form of refractor. J. E. K.

Observatory for Napa College.

The Trustees of Napa College have determined to erect an observatory for the use of the students and for general purposes, and intend to purchase a refractor of seven or eight inches aperture shortly.

Post-office at Mount Hamilton.

A post-office has been established at Mount Hamilton, and Mr. S. W. Burnham (in addition to his more strictly astronomical honors) has been appointed to be United States Postmaster. It is requested that in future all letters and parcels sent by mail should be addressed to "The Lick Observatory, Mount Hamilton, California, U. S. A." Money orders should be made payable at the post-office of San José. Telegrams from points in the United States should also be addressed to San José. Cable telegrams, however, should be sent to "Astronomer, San Francisco." Parcels from abroad may be dispatched through the agents of the Smithsonian Institution (free of cost).

E. S. H.

Occultation of *Mars* by the Moon, 1890, April 8.

On the morning of Wednesday, April 9 (civil date), *Mars* was occulted by the bright limb of the moon, shortly after sunrise. The